

Mariculture

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# Mariculture

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## Introduction

Kerala and Tamil Nadu contribute significantly to the mariculture in India. In Kerala mussel farming is carried out intensively in northern districts. In Tamil Nadu seaweed, *Kappaphycus alvarezii*, farming is gaining momentum in the recent years especially in Ramanathapuram district. The commercial cultivation of *K. alvarezii* was started in 2003 along the Tamil Nadu coast. At present, *K. alvarezii* production is carried out in five coastal districts of Tamil Nadu namely Ramanathapuram, Pudukottai, Thoothukudi, Thanjavur and Kanyakumari. Nearly 1000 to 1200 families in Tamil Nadu depend on *Kappaphycus* farming for their livelihood. All of the seaweed farming in Ramanathapuram district is under the kudumbam (family) model of cultivation. The cultivation is organized by members of an SHG who normally belongs to the same family but may also include other members from the same community. In Tamil Nadu from the year 2003 to 2009, *K. alvarezii* production has shown a steady increase from 147 tonnes to the maximum of 865 tonnes in the year 2009 on dry weight basis (Krishnan and Kumar, 2010). Both Kerala and Tamil Nadu states were selected to assess the literacy, health and income status of marine fisher folk involved in mariculture.

## Scope of the study

The study will provide a framework for drawing suitable programmes for the upliftment of fisherfolk in mariculture sector with particular focus on their literacy, health and income profiling. In short, the study will be highly useful to researchers, planners and policy makers in overcoming the problems of the socio economic parameters which determines the sustained development of the fisherfolk.

## Objective

The overall objectives of the study are to document the socio-economic status of fishers across the different coastal states in India. However the specific objectives are to assess the status of literacy, health and income of mariculture fishers in India.

### Methodology

The study was based on the data collected from primary and secondary sources. The primary data were collected from selected respondents using comprehensive and pre-tested questionnaires. The primary data provided concise, clear, complete, and unbiased information about the respondent. The important variables considered for the study were gender, age, literacy, health and income parameters

Both Kerala and Tamil Nadu states were selected to assess the literacy, health and income status of marine fisher folk involved in mariculture. In Kerala, Ernakulam, Kasargode and Kollam districts were selected. In Tamil Nadu, Ramanathapuram district was selected. These districts were selected, since mariculture activity was predominant. The study covered 225 respondent households, which included 125 households representing Kerala state and 100 households representing Tamil Nadu state. The sampling was done based on random sampling method from the selected villages.

### Data Collection

The data collection was done using a pre structured survey schedule (Annexure-I) after a reconnaissance survey from the selected sample respondents. The data collection was based on four parameters viz., the general particulars, literacy, health, and income profiling. The data collection was done by the project team in most cases and in some locations, trained enumerators were employed. The data collected were tabulated and the results were analyzed.

### Tools of Analysis

The conventional tools of analysis and percentage analysis were used to process the data of the literacy, income and health status of the fishers in India and to arrive at meaningful conclusions. The data obtained from the respondents were systematically tabulated for the purpose of analysis.

### Limitations of the study

The present study relied on primary data collected through the questionnaire survey methodology. The inherent faults and limitations in the primary data collection such as respondents' recall bias due to the absence of proper records on their income, health details, expenditure, savings and indebtedness etc with the respondents are to be recognized. The information was collected from the respondents based on their memory and experience and the bias cannot be eliminated fully. But in the context of the study, care was taken to avoid personal bias while giving information. Apparent limitations like getting only seasonal information; having data that is for a specified period of time, depending on data that is word of mouth (with its inherent contradictions) as primary data should be considered. The income and expenditure pattern and health parameters of the respondents subject to change in the short run as well as long run, also need to be considered. This study was confined to the randomly selected villages in coastal states of India.

## Results and Discussions

The results and discussions are presented under the following heads

- A. General Particulars
- B. Literacy Status
- C. Health Status
- D. Income Status

### A. General particulars

The general particulars of respondent's households included age, family size, family composition etc.

#### (i) Age distribution

The age distribution of the respondent households is furnished in Table 3.1. The age of the respondents are categorized into three sub groups viz, young (15-35 year), middle age (36-55 year), old (>56 year) etc. Mariculture continues to be an activity mostly done by fisher folk in the age group of 36-55 which constitutes about 63.11 per cent of the respondents. The distribution also indicated the representation of young (age less than 35) constituting to 25.33 per cent. The fisher folk with age more than 56 was found to be 11.56 per cent and represents the least. It was important to note that fishing appears as a viable option for livelihood among the age group of less than 35 years in Tamil Nadu.

#### (ii) Family composition

Table 3.1: Age distribution of the sample respondents (Years)

Sl.No.	State	<35	36-55	>56	Total
1.	Kerala	17 (13.60)	94 (75.20)	14 (11.20)	125 (100)
2.	Tamil Nadu	40 (40.00)	48 (48.00)	12 (12.00)	100 (100.00)
3.	Total	57 (25.33)	142 (63.11)	26 (11.56)	225 (100.00)

*Figures in parentheses indicate percentage to total*

The family composition of the respondents is indicated in Table 3. 2. It is seen from the Table 3.2 that the males outnumber the females in both the states. The male – female ratio for the entire sample was 1.12 which indicated that for every 1000 females there were 1120 males which is in parity with the national scenario (1.60, based on 2001 census). The male -female ratio for Kerala and Tamil Nadu state was 1.14 and 1.10 respectively. The male female ratios are depicted in Figure 3.1.

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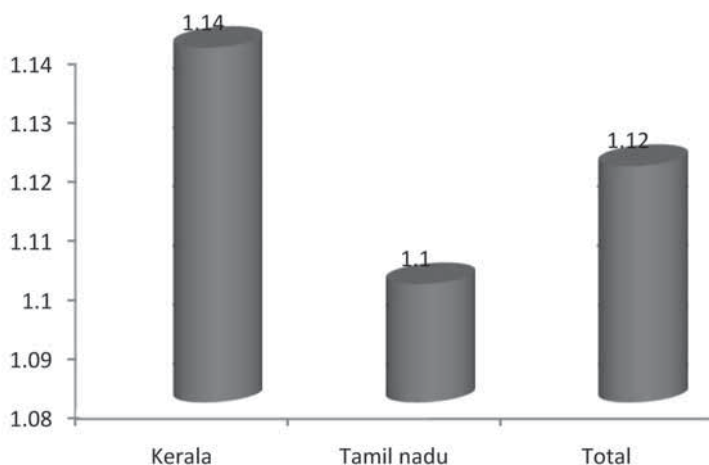


Fig 3.1: Male female ratio of mariculture fishers of Kerala and Tamil Nadu

Table 3.2: Family composition of the respondent households –Male and Female (Number)

Sl.No	State	Households	Male	Female	Total
1.	Kerala	125	249 (58.20)	219 (46.79)	468 (100.00)
2.	Tamil Nadu	100	192 (52.50)	174 (47.54)	366 (100.00)
3.	Total	225	441 (52.888)	393 (47.12)	834 (100.00)

Figures in parentheses indicate percentage to total

### (iii) Family size

The small family norm is mostly adopted by the fisher households of India. The average size of family in both the state worked out to be 3.70 ranging from 3.66 in Tamil Nadu to 3.74 in Kerala. However, Krishnan and Kumar, 2010 found that the average size of family among the sea weed farmers in Tamil Nadu is 4.5. The family type and family size of the respondents exhibited quite similar pattern of distribution in which a greater part (81.76 per cent) were from small families having a size between 2-4, i.e. most of them were from nuclear family. It was found that 17.78 per cent of the respondents belonged to the category of family size between 5-6. It is interesting to note that big families with more than 7-10 family members are not depicted in the study (Table 3.3).

Table 3.3: Family size of the respondent households (number)

Sl.No	State	Family Size			Total	Average family size
		1	2-4	5-6		
1.	Kerala	1 (0.80)	104 (83.20)	20 (16.00)	125 (100.00)	3.74
2.	Tamil Nadu	-	80 (80.00)	20 (20.00)	100 (100.00)	3.66
3.	Total	1 (0.44)	184 (81.76)	40 (17.78)	225 (100.00)	3.70

Figures in parentheses indicate percentage to total



#### (iv) Age composition

The age composition of the respondent households is represented in Table 3.4. The age composition is represented by adults (more than 15 years) and children (less than 15 years). The male- female ratio of the adult group (>15 years) was found to be 1.09 whereas the same for the children (<15 years) was found to be 1.23. Adult females in the age group of above 15 years outnumbered the families in both the states and similarly, among the children (<15years) males outnumber the females in both the states, justifying the common notion preference of males towards females. It is also significant to note that the younger generation of children is almost represented by males over female. The adult- child ratio was found to be 3.51 for the total sample. The Adult – Child ratio was highest for Kerala (4.78) followed by Tamil Nadu (2.52).

Table 3.4: Age composition of the respondent households (Number)

Sl. No	State	Adult (> 15 years)		Children (< 15 years)		Total	
		Male	Female	Male	Female	Male	Female
1.	Kerala	202 (81.12)	185 (84.93)	47 (18.87)	34 (15.60)	249 (100)	219 (100)
2.	Tamil Nadu	137 (71.35)	125 (71.84)	55 (28.65)	49 (28.16)	192 (100)	174 (100)
3.	Total	339 (67.87)	310 (78.88)	102 (23.13)	83 (21.12)	441 (100)	393 (100)

*Figures in parentheses indicate percentage to total*

### B. Literacy status

The literacy status of the respondent households was analyzed through the literacy level, educational status – continuing and dropouts and access to educational facilities. The illiterate indicates fisher folk without any formal education and doesn't even possess functional literacy.

#### (i) Literacy Status

The literacy status includes the level of education as indicated by primary, secondary and collegiate. The primary level indicated schooling till fourth grade, secondary level indicated by high school, secondary and vocational education. The collegiate level of education was denoted by collegiate and professional education.

The general literacy rate of India as a whole was 74.52 per cent (Census-2011) against the literacy rate of 95.44 per cent among the fisher folk. The results indicate that among the literates 35.10 per cent have primary level of education, 58.79 per cent have secondary level of education and hardly 6.01 per cent have collegiate level of education. The people with high school education was more in Kerala (78.24 per cent), whereas primary level was more in Tamil Nadu (61.29 per cent). This result derives support from the findings of Krishnan and Kumar, 2010.

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The literacy rate for the states of Kerala and Tamil Nadu were at 97.22 and 93.17. High percentage of literacy indicated that fisherfolk involving in farming gave more importance to education. Very meager percentage (3.00 per cent) were found to be illiterate in Tamil Nadu.

Table 3.5: Literacy Status of respondent households (Number)

Sl.No.	States	Total	Illiterate	Literate	Primary	Secondary	Collegiate
1.	Kerala	468	-	455 (100)	71 (15.60)	356 (78.24)	28 (6.15)
2.	Tamil Nadu	366	11	341 (100)	209 (61.29)	112 (32.84)	20 (5.87)
3.	Total	834	11	796 (100)	280 (35.10)	468 (58.79)	48 (6.01)

*Figures in parentheses indicate percentage to total*

### (ii) Educational profile

The information on education of the respondents in terms of continuance and discontinuance of education would provide the scope of employment opportunities, possible migration, and alternative avocation of the sample households. Thus continuing and dropout ratios were calculated among the respondent households across the coastal states in the country. The continuing drop out ratio indicates that the level of growing importance of education between the past and the present.

The dropouts were more at secondary level of education with 67.69 per cent ranging from 37.86 per cent at Tamil Nadu to 88.10 per cent at Kerala. (Table 3.6) The dropout at primary level of education was about 29.76 per cent ranging from 8.40 per cent at Kerala to 60.08 per cent at Tamil Nadu. The dropout at collegiate level was found to be 2.55 per cent and it varies from 2.06 at Tamil Nadu to 2.90 per cent at Kerala.

It was found that the tendency to drop out education was more with secondary education followed by primary and least with collegiate education. The drop outs possessing primary education was lesser as it is mandatory for the kids to study primary level of education. Collegiate education provided a source of alternate employment and another means of livelihood.

Table 3.6: Educational status of respondent households - Continuing and Dropout (Number)

Sl.No.	States	Continuing	Drop outs			
			Primary	Secondary	Collegiate	Total
1.	Kerala	110	29 (8.40)	306 (88.10)	10 (2.90)	345 (100)
2.	Tamil Nadu	98	146 (60.08)	92 (37.86)	5 (2.06)	243 (100)
3..	Total	208	175 (29.76)	398 (67.69)	15 (2.55)	588 (100)

*Figures in parentheses indicate percentage to total*



### (iii) Access to educational institutions

Access to education is an important yardstick to measure the socio-economic well being of a society. The proximity of the educational institutions like primary school, high school, college, and professional college provides a major impetus when it comes to continuing education. That was something the fisherfolk were said to be denied earlier which was disproved by the findings of the study.

The access to education was analyzed by finding the distance to nearby educational institutions. The average distance from fishing villages to nearby primary, high school, college and professional institution are given in Table 3.7. As a whole the average distance to a primary school is 0.92 km, high school is 2.16 km, college is 24.24 km and professional institution is 29.04 km from fishing villages combining both states. The average distance to primary school ranges from 1.00 km in Kerala to 0.84 km for Tamil Nadu. The distance to high schools ranges from 1.92 km for Kerala to 2.39 km for Tamil Nadu. With regards to colleges average distance ranges from 5.10 km for Kerala to 43.38 km for Tamil Nadu. The average distance to professional institution ranges from 7.38 km in Kerala to 50.70 km in Tamil Nadu. The results very clearly indicate the reasons for growing literacy among the fisherfolk. Thus the analysis clearly indicates that the improved or increased access to educational facilities has helped to increase the literacy level of the fisherfolk. However in Ramanathapuram district of Tamil Nadu the access to professional college is comparatively difficult.

Table 3.7: Access to Education (km)

Sl. No.	States	Primary School	High School	College	Professional College
1.	Kerala	1.00	1.92	5.10	7.38
2.	Tamil Nadu	0.84	2.39	43.38	50.70
3.	Average	0.92	2.16	24.24	29.04

## C. Health Status

### (i) Vaccination regime of infants / children (less than 15 years)

The average age of administration of vaccination and incidence of discontinuation among infants/ children with age less than 15 years in the selected coastal states of India is furnished in Table 3.8. The vaccination for Pox, BCG, MMR and Polio were regularly taken by all the families covered under the study. The average age at which the vaccination for pox was given to the child worked out at 1.13 years ranging from 1.00 year at Kerala to 1.25 years at Tamil Nadu. The average age at which BCG administered was 0.75 years ranging from 0.34 years at Kerala to 1.16 years at Tamil Nadu. The average age for administering MMR was 1.03 years which varies from 0.83 years at Kerala to 1.22 years at Tamil Nadu. Polio vaccine was administered till the average age of 4.44 years varying from 4.37 at Kerala to 4.5 at Tamil Nadu.

The results on the vaccination regime of infants/children indicated that the children were vaccinated in both the coastal states as per the recommendation of ICMR .

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Table 3.8: Vaccination regime of infants / children (less than 15 years) – Average Age of administration and incidence of discontinuation

Sl.No:	States	Average age of administration and incidence of discontinuation (percentage)									
		Pox		BCG		MMR		Polio		Others	
		Age	IOD (per cent)	Age	IOD (per cent)	Age	IOD (per cent)	Age	IOD (per cent)	Age	IOD (per cent)
1.	Kerala	1.00	0	0.34	0	0.83	0	4.37	0	-	0
2.	Tamil Nadu	1.25	0	1.16	0	1.22	0	4.50	0	-	0
3.	Average	1.13	0	0.75	0	1.03	0	4.44	0	-	0

*Normally polio administration continues till the age of 5 years*

### (ii) Birth weight of infants

The birth weight of infants in fisher households in the selected states is given in Table 3.9. The average birth weight of males was 2.69 kg and females was 2.72 kg. The average weight of male infants ranges from 2.69 kg at Kerala to 2.70 kg at Tamil Nadu and female infants ranges from 2.58 kg at Kerala to 2.85 kg at Tamil Nadu. This is in conformity with the average birth weight of a male and female child in India (Census-2001). The graphical representation of the birth weight of the male and female infants in both the states is presented in Figure 3.2.

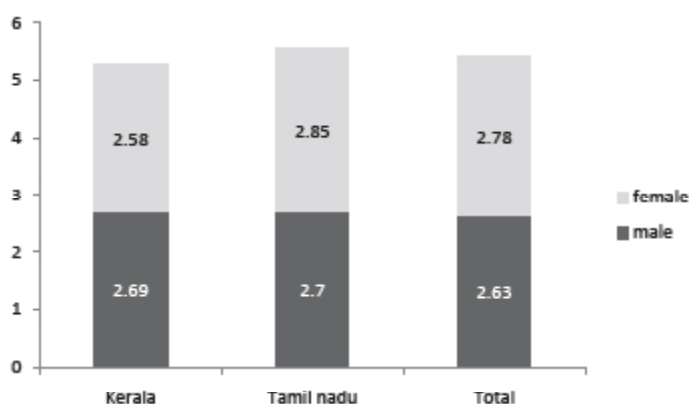


Fig. 3.2: The birth weight of male and female infants

It was found that in Kerala the average weight of the female child was less than that of the male child, whereas in Tamil Nadu the average weight of female was more than that of the male child.

Table 3.9: Birth weight of infants (kg)

Sl.No.	States	Weight (kg)		
		Male	Female	Total
1.	Kerala	2.69	2.58	2.63
2.	Tamil Nadu	2.70	2.85	2.78
3.	Average	2.69	2.72	2.71

### (iii) Incidence of mortality among mother/ child during birth

The results on the incidence of mortality among mother/ child during birth are furnished in Table 3.12. Maternal and child mortality at the time of birth and infant mortality has been pressing concerns over the past. Generally in India, adequate care is being taken now to reduce the incidence of maternal and infant mortality. There was no incidence of maternal mortality, however one incidence of infant mortality was reported in Tamil Nadu state.

Table 3.10: Incidence of mortality among mother/child during birth

Sl.No.	States	No of delivery	Mortality of mother/ child during birth				
			Mother	Reason	Child	Reason	Total
1.	Kerala	3	Nil	Nil	Nil	Nil	Nil
2.	Tamil Nadu	5	Nil	Nil	1	Nil	Nil
3.	Total	8	Nil	Nil	1	Nil	Nil

### (iv) Incidence of diseases among adults

The incidence, frequency, and previous occurrence of diseases among the adult family members of the respondents across the coastal states are discussed in the Table 3.11.

Major diseases found among the respondents were categorized under two groups, viz; common diseases and special ailments. Fever/flu, body ache, diarrhoea, gastro enteric disease, skin disorder and reproductive disorder is included in common diseases. Special ailments include diseases like cardiac failure, tuberculosis, anaemia, diabetics, blood pressure, AIDS. The most frequent disease found was fever with the occurrence of 1.47 times in a year for males and 1.39 times for females.

Among the family members 160 males and 147 females were affected with fever. In Ramanathapuram district of Tamil Nadu, 166 family members of the respondents were severely affected by malaria fever. However body ache was found to be more among males with an average frequency of 1.38 times per year and 93 male family members of the respondents were affected by body ache last year. In the case of female members, 59 members were affected by body ache last year with an average frequency of 1.36 times a year.

Reported cases of Diarrhoea and skin disorder found among the families of respondents were less across both states when compared to other common diseases.

Reported cases of special ailments found among the families of respondents were less across both the states. It is quite interesting to note that only few respondent households were affected with life style diseases.

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Table 3.11: Incidence of diseases among Adult (Male and Female) - Annual frequency

Sl.No.	Diseases	Districts					
		Kerala		Tamil Nadu		Total	
		M	F	M	F	M	F
(i) Common Diseases							
1.	Fever/Flu	1.43 (72)	1.39 (69)	1.50 (88)	1.40 (78)	1.47 (160)	1.39 (147)
2.	Body Aches	1.33 (28)	1.38 (17)	1.43 (65)	1.33 (42)	1.38 (93)	1.36 (59)
3.	Diahorrea	Nil	Nil	1.00 (16)	1.00 (18)	0.50 (16)	0.50 (18)
4.	Gastroenteric disease	0.66 (3)	Nil	Nil	Nil	0.33 (3)	Nil
5.	Skin disorder	1.00 (3)	0.33 (3)	1.00 (5)	1.00 (2)	1.00 (8)	0.67 (5)
6.	Reproductive disorder	0.33 (1)	Nil	Nil	Nil	0.17 (1)	Nil
(ii) Special Ailments							
7.	Cardiac failure	0.66 (2)	Nil	1.00 (3)	1.00 (2)	0.83 (5)	0.5 (2)
8.	TB	Nil	Nil	1.00 (1)	Nil	0.50 (1)	Nil
9.	Anaemia	Nil	Nil	Nil	Nil	Nil	Nil
10.	Diabetes	Nil	Nil	1.00 (1)	1.00 (1)	0.5 (1)	0.5 (1)
11.	Blood Pressure	Nil	Nil	1.00 (5)	1.00 (3)	0.5 (5)	0.5 (3)
12.	AIDS	Nil	Nil	Nil	Nil	Nil	Nil
13.	Others*	0.33 (2)	Nil	Nil	Nil	0.17 (2)	Nil

Figures in parentheses indicate the number of incidence in families,  
(\* others include Thyroid, Sinus)

### (v) Incidence of diseases among Adult (male and female) previous occurrence

The previous occurrence of diseases among adults (male and female) based on the number of months is discussed in Table 3.12.

The most common diseases prevalent among the respondent families were fever and body ache. On an average most recent occurrence of fever/flu was found among female members of the respondent families was 1.56 months and it was 1.49 months among male members.

In the case of body ache the previous occurrence was found in 1.75 months in males and 1.33 months ago in females. Occurrence of diahorrea was seen among male members and female with a previous occurrence of 1.32 and 1.49 months respectively.

The most common special ailments found among the respondents were cardiac failure, and blood pressure etc. Previous occurrence of cardiac failure among the male and female members was found in last month. Incidence of blood pressure was found three month ago in the case of male and 1.60 months ago in case of female respondents.

Table 3.12: Incidence of diseases among - Adult (Male and Female) Previous occurrence (Number of months)

Sl.No.	Diseases	Districts					
		Kerala		Tamil Nadu		Total	
		M	F	M	F	M	F
(i) Common Diseases							
1.	Fever/Flu	1.77	1.82	1.20	1.30	1.49	1.56
2.	Body Aches	1.26	1.42	2.23	1.23	1.75	1.33
3.	Diahorrea	0.33	1.33	2.30	1.65	1.32	2.77
4.	Gastroenteric disease	0.33	Nil	Nil	Nil	0.17	Nil
5.	Skin disorder	1.00	0.66	4.25	4.50	2.63	2.58
6.	Reproductive disorder	Nil	Nil	Nil	Nil	Nil	Nil
(ii) Special Ailments							
7.	Cardiac failure	0.66	Nil	1.00	1.00	0.83	0.5
8.	TB	Nil	Nil	Nil	Nil	Nil	Nil
9.	Anaemia	Nil	Nil	Nil	Nil	Nil	Nil
10.	Diabetes	Nil	Nil	Nil	Nil	Nil	Nil
11.	Blood Pressure	Nil	Nil	6.00	3.20	3.00	1.60
12.	AIDS	Nil	Nil	Nil	Nil	Nil	Nil
13.	Others*	0.5	0.33	Nil	Nil	0.25	0.17

Figures in parentheses indicate the number of incidence in families,

(\* others include Thyroid, Sinus)

#### (vi) Incidence of diseases among children (Male and Female) - Annual frequency

The annual frequency on the incidence of diseases among children (Male and Female) is furnished in Table 3.13.

Table 3.13 Incidence of diseases among children (Male &amp; Female) Annual frequency

Sl.No.	Diseases	Districts					
		Kerala		Tamil Nadu		Total	
		M	F	M	F	M	F
(i) Common Diseases							
1.	Fever/Flu	1.43 (72)	1.39 (69)	1.50 (88)	1.40 (78)	1.47 (160)	1.39 (147)
2.	Body Aches	1.33 (28)	1.38 (17)	1.43 (65)	1.33 (42)	1.38 (93)	1.36 (59)
3.	Diahorrea	Nil	Nil	1.00 (16)	1.00 (18)	0.50 (16)	0.50 (18)
4.	Gastroenteric disease	0.66 (3)	Nil	Nil	Nil	0.33 (3)	Nil
5.	Skin disorder	1.00 (3)	0.33 (3)	1.00 (5)	1.00 (2)	1.00 (8)	0.67 (5)

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6.	Reproductive disorder	0.33 (1)	Nil	Nil	Nil	0.17 (1)	Nil
(ii) Special Ailments							
7.	Cardiac failure	0.66 (2)	Nil	1.00 (3)	1.00 (2)	0.83 (5)	0.5 (2)
8.	TB	Nil	Nil	1.00 (1)	Nil	0.50 (1)	Nil
9.	Anaemia	Nil	Nil	Nil	Nil	Nil	Nil
10.	Diabetes	Nil	Nil	1.00 (1)	1.00 (1)	0.5 (1)	0.5 (1)
11.	Blood Pressure	Nil	Nil	1.00 (5)	1.00 (3)	0.5 (5)	0.5 (3)
12.	AIDS	Nil	Nil	Nil	Nil	Nil	Nil
13.	Others*	0.33 (2)	Nil	Nil	Nil	0.17 (2)	Nil

*Figures in parentheses indicate the number of incidence in families, (\* others include Brain disorder)*

Major diseases found among the children in the study area were fever/flu, body ache, diarrhoea, gastro enteric disease, skin disorder etc in which fever was the most popular disease found among the children and it was distributed across both the coastal states. The average frequency of fever among male children was 1.88 times per year and a total of 52 male children were affected by fever across the surveyed area. In the case of female children a total number of 54 were affected by fever with an average annual frequency of 1.52 times per year. In Ramanathapuram district of Tamil Nadu, 55 children of the respondents were severely affected by malaria fever.

Body ache was found to be more among females with an average frequency of 0.63 times per year and 10 children of the respondents were affected by body ache. In the case of male members, 8 members were affected by body ache with an average annual frequency of 0.43.

Diarrhoea was found commonly among male members with an average frequency of 0.50 times per year and two male children were affected by diarrhoea.

There weren't any reported cases of special ailments found among the families of respondents across both the states. It is quite interesting to note that the respondent household's children were not affected with life style diseases. There was not even a single child member with special ailments or life style diseases like diabetics, blood pressure and AIDS.

### (vii) Incidence of diseases among Children - Previous occurrence

The previous occurrence of diseases among children based on the number of months is discussed in Table 3.14.

The most common diseases prevalent among the children of the respondent families were fever and body ache. On an average most recent occurrence of fever/flu was found among male children of the respondent families was 2.18 months and it was 2.50 months



among female children .In the case of body ache the previous occurrence was found in 1.02 months in males and 1.13 months ago in females. Occurrence of diahorrea and skin disorder was seen among male children and female with a previous occurrence of 0.83 and 0.17 months respectively.

Table 3.14: Incidence of diseases among - Children (Male and Female) Previous occurrence (Number of months)

Sl.No.	Diseases	Districts					
		Kerala		Tamil Nadu		Total	
		M	F	M	F	M	F
(i) Common Diseases							
1.	Fever/Flu	1.36	1.5	3.00	3.50	2.18	2.50
2.	Body Aches	0.33	0.66	1.70	1.60	1.02	1.13
3.	Diahorrea	Nil	0.33	1.65	Nil	0.83	0.17
4.	Gastroenteric disease	Nil	Nil	Nil	Nil	Nil	Nil
5.	Skin disorder	Nil	Nil	Nil	Nil	Nil	Nil
6.	Reproductive disorder	Nil	Nil	Nil	Nil	Nil	Nil
(ii) Special Ailments							
7.	Cardiac failure	Nil	Nil	Nil	Nil	Nil	Nil
8.	TB	Nil	Nil	Nil	Nil	Nil	Nil
9.	Anaemia	0.33	Nil	Nil	Nil	0.17	Nil
10.	Diabetes	Nil	Nil	Nil	Nil	Nil	Nil
11.	Blood Pressure	Nil	Nil	Nil	Nil	Nil	Nil
12.	AIDS	Nil	Nil	Nil	Nil	Nil	Nil

### (viii) Access to health care

The access to health care is also an important parameter which determines the continued health of the fisherfolk. Often the distance leads to the non treatment or its delay. The access to health care was measured using the distance required to avail the same. (Table3. 15). The results indicate that there exists considerable access to the primary health centre and hospital. On an average the primary health centre was available at a distance of 1.67 km and the hospital at 4.38 km. The average distance for the primary health centre ranged from 1.21 km in Kerala to 2.12 km in Tamil Nadu.

Table 3.15: Access to health care (km)

Sl.No.	States	Primary Health Centre	Hospital
1.	Kerala	1.21	2.26
2.	Tamil Nadu	2.12	6.50
3.	Average	1.67	4.38

### (ix) Problems in health management

The major problems underwent in health management was analyzed based on the opinion of the sample respondents. The major reasons cited by the respondents are indicated in Table 3.16. The major reasons suggested include drinking water problem (35.11 per cent), problems on cleanliness/sanitation (22.22 per cent), non availability of specialist and paramedicines in health centers (17.78 per cent), lack of adequate effective medicines (12.44 per cent) and, poor infrastructure (9.78 per cent).

The state level analysis of the sample respondent households indicated that the non availability of specialist and paramedicines in health centers and poor access to safe drinking water was the major problems perceived by the respondents in Kerala.

Table 3.16: Problems in health management (Frequency)

Sl.No.	Problems	States		
		Kerala	Tamil Nadu	Total
1.	Non availability of specialist and paramedicines in health centers	18 (14.40)	22 (22.00)	40 (17.78)
2.	Poor infrastructure	9 (7.20)	13 (13.00)	22 (9.78)
3.	Lack of adequate effective medicines	10 (8.00)	18 (18.00)	28 (12.44)
4.	Problems on Cleanliness/ Sanitation	17 (13.60)	33 (33.00)	50 (22.22)
5.	Drinking water problem	1 (0.80)	78 (78.00)	79 (35.11)

*Figures in parentheses indicate percentage to total respondents  
Number of respondents who had opined on the same*

### (x) Suggestions to improve healthcare facilities

The respondent households opined on the different suggestions for improving the health care facilities and the details are furnished in Table 3.17. The major suggestions cited by the respondents includes the following; increasing the number of doctors/specialists, construction of quarters facility for doctors so that they are available 24 x 7, providing available sufficient medicines for all diseases with free of cost, construction of the modern hospital with all infrastructure and healthcare facilities, provision of ambulance for emergency (especially during delivery accidents, etc.) and providing good drinking water facility.

It was found that the most important suggestion which was opined by the respondent of both the states was providing good drinking water facility(43.11) followed by construction of the modern hospital with all infrastructure and healthcare facilities (30.07 per cent), increasing the number of doctors/specialists (23.75 per cent)and to provide available sufficient medicines for all diseases with free of cost(16.11 per cent).

Table 3.17: Suggestions to improve health care facilities (Frequency)

Sl. No.	Suggestions	States		
		Kerala	Tamil Nadu	Total
1.	Increase the number of doctors/specialists	10(8.00)	15(15.00)	25 (11.11)
2.	Make quarters facility for doctors so that they are available 24 x 7	3(2.40)	4(4.00)	7 (3.11)
3.	Make available sufficient medicines for all diseases with free of cost	12(9.60)	18(18.00)	30 (13.33)
4.	Construct the modern hospital with all infrastructure and health care facilities.	41(32.80)	38(38.00)	79 (35.11)
5.	Provide ambulance for emergency (especially during delivery accidents, etc.)	18(14.40)	8(8.00)	26 (11.56)
6.	Need good drinking water facility	19(15.20)	78(78.00)	97 (43.11)

*Figures in parentheses indicate percentage to total respondents  
Number of respondents who had opined on the same*

## (D) Income status of respondent households

The income profile of the respondent households are analyzed using income patterns, respondents involvement in non fisheries activities and expenditure pattern. In addition the indebtedness and savings were analyzed using details on savings, indebtedness, sources of lending organization, purpose of availing loan and suggestions for enhancing the income and employment generation.

### (i) Monthly Income

The income pattern of the respondent household was analyzed using the monthly income across the both states of India (Table 3.18).

The major income sources of the respondent households comprised of income from fishery (mariculture), business, agriculture, labour services and other service sectors. The highest monthly average income generated by the total respondents across both the states was through fisheries sector with an average amount of Rs.9440.52 (69.31 per cent of the total income) followed by income from labour sector at Rs.3570.00 (26.21 per cent), agriculture at Rs 350.00 (2.57 per cent) and business sector at Rs 171.93 (1.26 per cent).

The state wise monthly income status of the respondents indicated that Tamil Nadu has the highest income from fisheries (mariculture) sector which contributed to 80.35 per cent of the total income. In Kerala the income from labour sector was near to fishery sector which contributed to 39.68 per cent of the income.

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Table 3.18: Monthly income status of the respondents (Rs. )

Sl. No.	States	Enterprise					Total
		Fishery	Labour	Agriculture	Business	Any others	
1.	Kerala	3800.52 (57.56)	2620.00 (39.68)	-	93.36 (1.41)	88.00 (01.33)	6601.88 (100.00)
2.	Tamil Nadu	5640.00 (80.35)	950 (13.54)	350 (4.99)	78.57 (1.12)	-	7018.57 (100.00)
3.	Total	9440.52 (69.31)	3570 (26.21)	350 (2.57)	171.93 (1.26)	88.00 (0.65)	13620.45 (100.00)

*Figures in parentheses indicate percentage to total*

### (ii) Involvement in non fisheries activities

The Involvement of respondent' households in non fisheries activities are illustrated in the Table 3.19.

The analysis on the respondent household's involvement in the non fisheries activities indicated that 31.56 per cent of the total respondents were involved in non-fisheries activities, which provided an additional source of income. The respondents involved in non-fishing activities were more in Tamil Nadu (34.00 per cent) than Kerala (29.60 per cent). The major non fishing activities involved by respondents were labour, business, agriculture, and other service sectors with a contribution of 24, 5, 9 and 3 per cent respectively. The total number of respondents involved in business was 2.22 per cent. In Kerala 24.80 per cent of the respondents involved in labour activities which might be due to more employment opportunity and higher wage rate prevailing in the state. The result clearly indicated the existence and practice of alternative livelihood option holds good in the selected respondent households.

Table 3.19: Respondents involvement in non-fisheries activities

Sl. No.	States	Respondents involved in non-fisheries activities				Total
		Labour	Agriculture	Business	Any others	
1.	Kerala	31 (24.80)	-	3 (2.40)	3 (2.40)	37 (29.60)
2.	Tamil Nadu	23 (23.00)	9(9.00)	2 (2.00)	-	34 (34.00)
3.	Total	54 (24.00)	9 (4.00)	5 (2.22)	3 (1.33)	71 (31.56)

*Figures in parentheses indicate percentage to total*

### (iii) Pattern of expenditure

The major household expenses measured include expenditure on food, clothing, fuel, medical, education, entertainment, personals and durables. The result of the pattern of monthly expenditure is represented in Table3. 20.

The average monthly expenditure pattern of the 225 households worked out was Rs 6370.40 with a share of Rs 2341.38 (36.75 per cent) on food and Rs1916.10 (30.08 per cent) on personal. The least expenditure was Rs.491.32 (3.86 per cent) to purchase consumer durables.

The total expenditure pattern of the selected states indicates that the highest household expenditure was noticed in Tamil Nadu with an average amount of Rs. 6743.49 followed by Kerala with Rs 5997.32.

Table 3.20: Monthly expenditure pattern of fisher family (Rs)

Sl. No.	States	Items								
		Food	Cloth-ing	Fuel	Medi-cal	Edu-cation	Enter-tain-ment	Per-sonal	Dura-bles	Total
1.	Kerala	1841.32 (30.70)	607.52 (10.12)	380.40 (6.34)	329.72 (5.49)	330.92 (3.82)	229.32 (3.82)	2040.80 (34.03)	237.32 (3.95)	5997.32 (100.00)
2.	Tamil Nadu	2841.43 (42.14)	351.40 (5.21)	300.23 (4.45)	464.30 (6.89)	490.60 (7.28)	250.13 (3.71)	1791.40 (26.56)	254.00 (3.77)	6743.49 (100.00)
3.	Total	4682.75 (36.75)	958.92 (7.53)	680.63 (5.34)	794.02 (6.23)	821.52 (6.45)	479.45 (3.76)	3832.20 (30.08)	491.32 (3.86)	12740.81 (100.00)

Figures in parentheses indicate percentage to total

#### (iv) Indebtedness and Savings

The indebtedness and savings of the respondent households are indicted in Table 3.21.

The saving details of the respondent's household indicated that 76.89 per cent of the respondents have no savings. 14.22 per cent of the respondent households possessed a saving of less than Rs 50000. 14.22 per cent of the respondents have a saving of Rs 50000-100000. Around 1.78 per cent of the respondent households had a savings of more than a lakh rupee. The details on the frequency of respondents having saving across both the coastal states is graphically represented in Fig. 3.3.

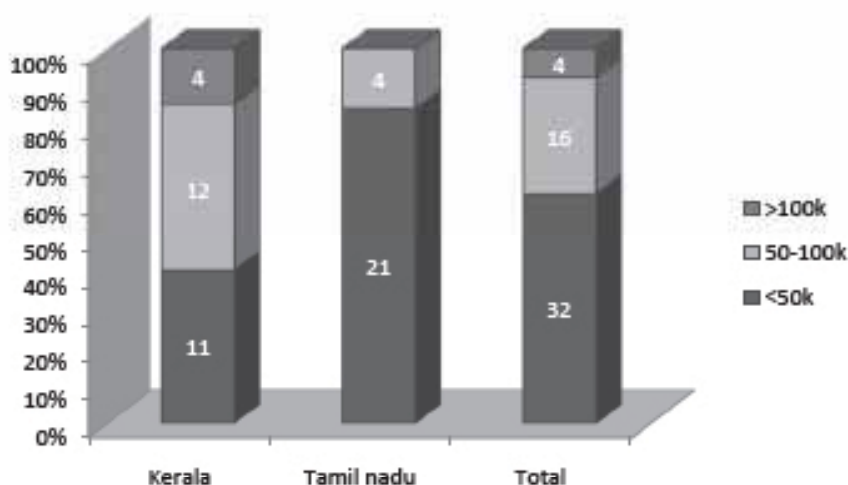


Fig. 3.3: Distribution of respondents based on savings

It was found that the frequency of respondents possessing savings was almost similar in both the states.

## Livelihood Status of Fishers in India

Table 3.21: Savings details of respondent households (Number)

Sl. No.	States	Frequency of respondents having Savings				Total
		Nil	< 50 k	50-100.00k	>100.00K	
1.	Kerala	98 (78.40)	11 (8.80)	12 (9.60)	4 (3.20)	125 (100.00)
2.	Tamil Nadu	75 (75.00)	21 (21.00)	4 (4.00)	-	100 (100.00)
3.	Total	173 (76.89)	32 (14.22)	16 (7.11)	4 (1.78)	225 (100.00)

*Figures in parentheses indicate percentage to total*

### (v) Indebtedness of the respondents households

The lack of savings and increased expenditure for mere sustenance often lead to indebtedness. The pattern of indebtedness of respondent households across the different coastal states of India is discussed in Table 3.22.

The results indicated that the average amount of indebtedness per person was Rs 29931.85 in which the highest average amount of indebtedness was recorded in Kerala with Rs 34133.30. The highest number of respondents who borrowed money for different purposes was found in Tamil Nadu with 48.00 per cent followed by Kerala with 42.40 per cent. The average amount of loan repayment was Rs 5945.27(19.86 per cent). Nearly 80.00 per cent of the amount has to be repaid by the respondent household of both states.

Table 3.22: Indebtedness of respondent's households (Rs.)

Sl. No.	States	Frequency of respondents having Savings		
		Number of persons	Average Amount per person	Average Repayment paid
1.	Kerala	53 (42.40)	34133.30	5689.93 (16.66)
2.	Tamil Nadu	48 (48.00)	25730.40	6200.60 (24.09)
3.	Total	101 (44.89)	29931.85	5945.27 (19.86)

*Figures in parentheses indicate percentage to total*

### (vi) Sources of lending

The indebtedness often results in availing loans from the different institutions. The major sources of lending include banks, co-operatives, private money lenders, friends/relatives and jewel loans. The details of the sources of money lending as availed by the respondent households is furnished in Table 3.23.

A total of 102 respondents had availed loans for various purposes. It was found that banks constituted the major source of loans with more than 17.78 per cent of the respondent households availed the credit. Cooperative provided credit to 30 respondents in Kerala and constituted 13.33 per cent of the total respondents. Private money lenders provided loan to 9.33 per cent of the respondents.



Table 3.23: Sources of lending

Sl. No.	Sources	States		
		Kerala	Tamil Nadu	Total
1.	Banks	12 (9.60)	28 (28.00)	40 (17.78)
2.	Co-operative	30 (24.00)	-	30 (13.33)
3.	Private money lenders	11(8.80)	10 (10.00)	21 (9.33)
4.	Friends / Relatives	-	-	-
5.	Jewel loans	1 (0.80)	5 (5.00)	6 (2.67)
6.	Others ( SHGs )	-	5 (5.00)	5 (2.20)

Figures in parentheses indicate percentage to total

### (vii) Purpose of availing loans

The details on the purpose of availing loans and number of loans availed by the respondent households are indicated in Table 3.24.

The major purposes for which loans were availed included purchase of craft/gear and other fishing related equipment/seaweed farming, house construction/land purchase, marriage expenses., education, health and social security.

Loans were mainly availed for purchase of gears and other fishing related equipments, seaweed farming etc. It was found that of the 102 respondents who availed loans, 13.78 per cent was availed for the purpose of purchase of gears and other fishing related equipment and seaweed farming. House construction and land purchase was the reason for getting loan for 18.22 per cent of the respondent households. Other expenses like business and purchase of vehicle also was the reason for taking loan for 1.33 per cent. Marriage expenses assumed a major purpose of loan for 4.89 per cent of the respondent households. 28.00 per cent of the respondent households in Tamil Nadu availed loan for seaweed farming, whereas similar per cent of respondent households in Kerala availed loan for house construction and land purchase.

Table 3.24: Purpose of availing loans (Number.)

Sl. No.	Purpose	States		
		Kerala	Tamil Nadu	Total
1.	Purchase of craft/gear and other fishing related equipments/seaweed farming	3(2.40)	28(28.00)	31 (13.78)
2.	House construction / Land purchase	36(28.80)	5(5.00)	41 (18.22)
3.	Marriage expense	5(4.00)	6(6.00)	11 (4.89)
4.	Education	4(3.20)	4(4.00)	8 (3.56)
5.	Health and Social Security	5(4.00)	3(3.00)	8 (3.56)
6.	Any others ( business and purchase of vehicles)	-	3(3.00)	3 (1.33)

Figures in parentheses indicate percentage to total

### (viii) Suggestions to enhance the income and employment generation

The percentage response of the respondents' suggestions for enhancing the income and employment generation by fishermen is indicated in Table 3.25.

The major suggestions perceived by the households included arranging the institutional financial support like micro credit for fisherfolk; SHG, etc, regulation of fish marketing through institutional interventions; vocational training for fisherwomen to undertake house hold income activities during dry/off season; regulation of PDS and supply of the basic food items and fuel(like kerosene, LPG, etc) by the Govt. agencies and provision of rural infrastructure for general societal / human development.

The percentage response of the respondents indicated that 27.56 per cent of the respondents felt that arranging the institutional financial support like micro credit for fisheries, SHG, etc can provide a major impetus in enhancing the income and employment generation by fisherfolk in mariculture followed by the regulation of fish/seaweed/mussel marketing through institutional interventions (14.22 per cent). The opinion on provision of rural infrastructure for general societal / human development was 12.44 per cent.

Table 3.25: Suggestions for enhancing the income and employment generation by fishermen (Percentage response)

Sl. No.	Suggestions	States		
		Kerala	Tamil Nadu	Total
1.	Arranging the institutional financial support like micro credit for fisheries, SHG, etc	27 (21.60)	35 (35.00)	62 (27.56)
2.	Regulation of fish/seaweed/mussel marketing through institutional interventions	14 (11.20)	18 (18.00)	32 (14.22)
3.	Vocational training for fisherwomen to undertake house hold income activities during dry/ off season	19 (15.20)	9 (9.00)	28 (12.44)
4.	Regulation of PDS and supply of the basic food items and fuel(like kerosene ,LPG etc) by the Govt. agencies	-	5 (5.00)	5 (2.22)
5.	Provisional of rural infrastructure for general societal / human development	-	5 (5.00)	5 (2.22)

*Figures in parentheses indicate percentage to total*



Figure 3.4: *Kappaphycus alvarezii* farming site at Palk Bay region of Ramanathapuram district of Tamil Nadu.



Figure3.5: Women involved in seaweed farming



Figure3.6: Data Collection



Figure 3.7: Kappaphycus fragments ready for seeding



Figure 3.8: Seaweed farmers residing at shore side of Pamban, Palk Bay region of Ramanathapuram district of Tamil Nadu